

GUILLAUME BIGOURDAN.—We have lost in M. Bigourdan a veteran astronomer who for many years, at the Paris Observatory, worked with the utmost assiduity in the observations of the positions of nebulae and clusters, and was later Director of the Bureau International de l'Heure from its commencement till 1928.

Born at Sistels (Tarn-et-Garonne) on 1851 April 6, he graduated at the École d'Astronomie in Paris, and in 1877 was appointed by Tisserand as an assistant in the Observatory of Toulouse. He was put in charge of the meridian instrument, but held this post for only a short time, as Tisserand was appointed Director of the Paris Observatory shortly afterwards, and brought Bigourdan to Paris in 1879, where he was given charge of the great equatorial. He at once commenced the great work of determining by visual observations the accurate positions of all the known nebulae of the northern hemisphere. He never missed a fine night, and his observations are published in five volumes of the *Annales* of the Paris Observatory and occupy no less than three thousand pages. He gives a history of the discovery and previous observations of these nebulae. The intention underlying these arduous observations was that the positions of these distant objects might be sufficiently well known for astronomers in the future to determine their motions. Incidentally he discovered many new nebulae, and made measures of the positions of comets and of double stars.

In 1882 M. Bigourdan took part in the observations of the transit of Venus in Martinique. Profiting by his stay in the island, he made observations of the comet of that year for which he was awarded the Lalande Prize. In 1892 he went to Senegal to observe the total eclipse of the Sun, and on the same expedition made a determination of the value of gravity at Joal. In 1900 and 1905 he observed total eclipses of the Sun in Spain and Tunis.

Owing to discordances in the previous determinations of the longitude Paris-Greenwich, a redetermination was made in 1902. The French observers, M. Bigourdan and M. Lancelin, worked in parallel with the English observers, F. W. Dyson and H. P. Hollis. The previous discrepancy was cleared up and results obtained in satisfactory accordance, the concluded value differing only $0^s.01$ from the recent determinations, which had the advantage of a moving micrometer and wireless time-signals.

M. Bigourdan was interested in the transmission of time-signals by wireless, due so largely to the initiative of General Ferrié. On his suggestion the installation at Greenwich was erected in 1912, and the signals from the Eiffel Tower recorded daily. After the conferences at Paris in 1912 and 1913 the International Time Service was established, with a Bureau at Paris, of which M. Bigourdan was constituted Director. The War intervened, but after its conclusion M. Bigourdan remained Director in close touch with M. Baillaud and General Ferrié.

M. Bigourdan was made a member of the Bureau de Longitudes in 1903, and continually enriched the *Annuaire* with notices on interesting researches in current astronomy, such as determinations of parallax, classification of stellar spectra, variable stars. After his retirement from the Bureau de l'Heure in 1928, when he was seventy-seven years old, he gave in the *Annuaire* a history of the Bureau de Longitudes. The fourth part of this history was published in 1932, only a short time before his death. His most important historical work, *Annales célestes du dix-septième siècle*, by A. G. Pingré, has a curious history. The manuscript was completed in 1791, and a beginning made of its publication. This went on very slowly till the death of Pingré and then ceased. The manuscript was lost, and found by M. Bigourdan at the Paris Observatory under a wrong designation. It was printed in 1901 under the auspices of the French Academy.

M. Bigourdan was elected a member of the Académie des Sciences in 1904, and became Vice-President in 1923. He attended many astronomical conferences, both in Paris and other cities, where he put forward his views with vigour and courtesy.

He married a daughter of Admiral Mouchez, the Director of the Paris Observatory, who inaugurated the Carte du Ciel.

M. Bigourdan was elected an Associate of the Royal Astronomical Society on 1903 November 13, and was awarded the Gold Medal in 1919.

F. W. D.

GUSTAVE FERRIÉ was born in 1868. He was a student at the École Polytechnique, and became Sub-lieutenant of Engineers in 1889. He remained throughout his life a man devoted to the Army, and passed

through its various grades in due course, until as General, and possessing many distinctions and honours, with the whole organisation of army communications under his control, as a culminating honour he was retained for service by a special law, setting aside in his case the fixed age for retirement. In all his career he showed an admirable energy, which he never spared, with a capacity for organisation and a clearness and economy of statement that were a sheer pleasure to witness. He had a strong constitution, from which in the end he asked too much, for he died at the age of sixty-four. It would be impossible to exaggerate the feeling of devotion he aroused, as one who never spared himself, especially when there was hard or dangerous work to be done. His modesty was inherent in his nature. He cultivated his subject of communications, not only because it formed the nervous system of the army, but with an unflagging enthusiasm in which the settled will of the man enshrined all that was permanent and best in the outlook he had brought to it as a youth. This side of Ferrié's life is fully detailed by his friend and colleague, Col. Brenot, to whose Memoir those interested may be referred; several of the facts of this notice are drawn from his account. Changing the unique features, possibly nearly the same might be said of many officers. They are well worth knowing; but as scientific men we may pass them aside, and we shall confine what follows to his scientific influence, remembering only that, however important, it was a mere parergon.

It was not Ferrié's habit ever to put together any claim or case for himself, and this makes it barely possible, nor should one try, to separate the contributions of individuals to a subject like radiotelegraphy, which began within the lifetime of many of us, in obscurity, as an unformed, inchoate infant. A great many people were working at it. Across the page of its history comes the War, when ideas and methods were borrowed, taken, given, with no acknowledgment possible. Suffice it to say that Ferrié began in 1898, with a certain authority indeed, but provided with resources almost ludicrously inadequate, such as seemed to express all that was worst of official distrust and appeared to be directed to produce a failure instead of a success. Eleven years this kind of thing lasted, and would have stifled development under hands less indomitable and enthusiastic than Ferrié's. With him it only perfected his readiness to accommodate every point of view that did not clash with his main object. Compared with these almost recent days, the present position, when we cannot think radiotelegraphy away, forms a complete contrast. It is not implied that all the incidents of advance are due to Ferrié alone, nor would he wish that that should be said; he was always a good friend, and knew and valued many men; nor had he any narrow national ambitions. But we may safely say that what he did not do himself he encouraged and made possible for others by his heartening support.

A characteristic feature of Ferrié's scientific view, and one which he was very well placed to effect, was international organisation, in which astronomers have long led the way. One of the earliest of these was the International Conference on Time, summoned at the invitation of the

French Government in 1913. Ferrié took a prominent part in this, both as an organiser and as one of the secretaries. The time-signals then issued from the Eiffel Tower, as well as those originating in the United States, marked a course that required regulating. A convention was reached, not without difficulty, which was more or less of a diplomatic character. In the end, the War intervened and no country ratified it. But its terms served as a model for much of the first statutes of the I.A.U., drawn up at Brussels in 1919, in which it was partly incorporated. In post-war days the position, needless to say, was much altered, and from this time dates the wider knowledge of Ferrié among astronomers. He was first President of the Commission No. 18—On Longitude by Wireless Time-Signals—a commission shared between the I.A.U. and the I.G.G.U.—and he was Vice-President of Commission No. 31—On Time. The organisation of time reception was centred at the Observatory of Paris, as well as certain duties of emission of time-signals also. It is fair to say that neither of these would have been practicable without the resources that Ferrié could then command and was willing to use. Further, he was an intimate friend of M. B. Baillaud, then Director of the Observatory, and the Observatory owes much to his advice, assistance, and indeed to his inventions. Among the last is a clock, dependent for maintenance upon a photo-electric cell, so that the pendulum is kept in oscillation, and its oscillations counted, without any mechanical contacts whatever. This piece is still in use.

He was also the originator and first president of the International Union of Scientific Radiotelegraphy.

But what most astronomers and geodesists will recall is his work in connection with Commission No. 18 of the I.A.U. in organising a revision of World Longitudes by Wireless Time-Signals. He saw clearly that long-distance wireless reception offered a unique opportunity for binding into one the longitudes of the whole world in a way that had never been possible before. To work out a plan, and to obtain the consent and co-operation of the very numerous countries and individual astronomers concerned, was a different matter. It may safely be said that it would not have been possible, or at least it would have been seriously protracted, without Ferrié's drive and capacity. Nor, we may notice, would it have been possible, without the existence of the international unions concerned; and if it stood alone it would of itself justify their utility. As it was, he only saw completed a preliminary essay made in 1926; but that was on so large a scale, and yielded so many valuable results, as to leave no doubt that it ought to be repeated in a definitive manner, which it is hoped to do in the present year.

Ferrié was married to a devoted wife, who survives him. They leave no children. He was elected Associate on 1928 June 8. He died on 1932 February 16.

R. A. S.